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SUPSHIP Bath

Assessment of Alternatives for New
Construction Risk Management



January 29, 2002

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Background

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Background

Project background

- In June 2001, SUPSHIP Bath (Maine) engaged Mercer Management Consulting to evaluate the feasibility of alternatives means to manage the risks inherent in its mission
- For the purposes of this study, the primary focus was on SUPSHIP's mission and functions in Bath, Maine
- MMC is one of the world's largest general management consulting firms with more than 30 years of experience in shipbuilding and marine transportation strategy and planning
 - MMC is a sister company of Marsh Marine & Energy, which is the world's leading provider of shipbuilding insurance and has provided insurance to US and foreign shipyards building naval and commercial ships

Background

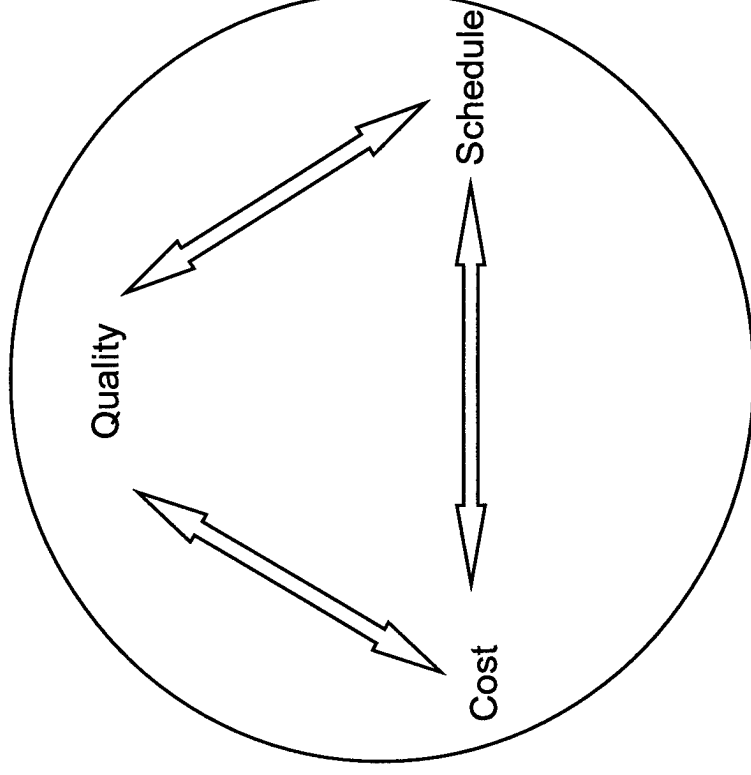
SUPSHIP organization

- SUPSHIP offices are organized in two models:
 - New Construction offices that also oversee overhaul and repair
 - Offices that only oversee overhaul and repair
- SUPSHIP Bath is one of nine SUPSHIP offices in the following locations:
 - Bath, ME (NC)
 - Groton, CT (NC-submarines only)
 - Newport News, VA (NC)
 - Portsmouth, VA (O&R)
 - Jacksonville, FL (O&R)
 - Pascagoula, MS (NC)
 - New Orleans, LA (NC)
 - San Diego, CA (NC) & (O&R)
 - Puget Sound, WA (O&R)
- This study focuses on new construction activity at SUPSHIP Bath

Background

SUPSHIP Bath Mission Statement

SUPSHIPS Bath exists to proactively manage assigned contracts to build, maintain, and modernize surface ships which meet our customer's needs and expectations



Background

SUPSHIP Offices and Functions

SUPSHIPS Line Departments and Offices

- Program Management
- Engineering and Planning
- Quality Assurance
- Contract Administration
- Material Management/Logistics - spares
- Availability Management
- Financial Management and Accounting
- SUPSHIPS Support Departments and Offices
 - EEO
 - Counsel
 - Review staffs
 - Personnel
 - Health & Safety

SUPSHIPS Roles in New Construction

- Oversee and approve construction work
- Enforce all applicable contractual policies, requirements, and procedures
- Approve and manage payments
- Oversee government-funded materiel
- Manage change orders
- AEGIS Integration
- Attend and evaluate testing and trials
- Prepare for INSURV acceptance
- Planning repair availabilities
- Shipboard loadout
- Business surveillance
- Resolve technical problems
- Crew orientation and integration

Executive summary

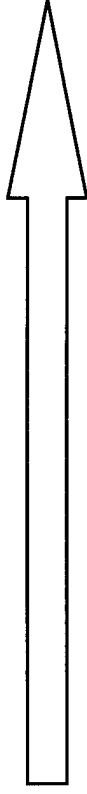
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Executive Summary

SUPSHIP seeks to answer two fundamental questions

QUESTION

Could SUPSHIPS
outsource its core
activities for a net overall
benefit to the DOD?



ANSWER

No.

- There are not viable commercial options
- If an option were found or created, outsourcing would incur higher costs for the DOD through various direct and consequential outcomes

Can the Navy eliminate
SUPSHIP new construction
activity and instead guarantee
desirable program outcomes
by transferring risks to
shipbuilding contractors and
insurers?



No.

- Insurance cannot cost effectively achieve quality, cost, and schedule objectives and would impose higher costs for the DOD

Executive Summary

Could SUPSHIP outsource its core activities for a net overall benefit to the DOD?

- SUPSHIP Bath cost is competitive with commercial costs to perform similar functions for the most complex offshore energy rigs and platforms and ships when measured as a percentage of the shipyard contract value
- There is no other organization that currently provides ship construction oversight on such a large and complex scale, nor is there any analogous capability in other DOD services or commercial industry
- The mission-critical and highly complex nature of SUPSHIP Bath programs do not lend themselves to oversight by an entity not:
 - Solely-accountable and responsible to the United States
 - Fully aligned with the ultimate highest interests of the DOD
 - Intimately familiar with the entirety of the program
- Even if a commercial capability were to exist, the DOD would be forced to retain a wide range of capabilities to contract, administer, direct, and monitor the activities of the commercial capability and also to determine the DOD's best interests
- Normal commercial operations including profit margins, marketing, sales, contract administration, and other costs, combined with higher pay scales and different benefits accounting procedures would lead to costs significantly higher than those of SUPSHIP Bath

Executive Summary

Could the Navy eliminate SUPSHIP new construction activity and instead guarantee desirable program outcomes by transferring risks to shipbuilding contractors and insurers?

- Risk transfer is not possible
 - There is no market for such risk placement
 - The risks are too complex to define in a manner that shipyards would assume or be able to place with underwriters
 - The involvement of exclusively financially-driven insurance underwriters into DOD shipbuilding would create unacceptable problems for the DOD in terms of quality, cost, and schedule
 - The insurance market is global by nature and the underwriting community would require the programs to disclose detailed and sensitive information before accepting the risks and honoring claims, even assuming that insurance capacity was available
 - Insurance of change-orders and their impacts on cost, quality (performance) and schedule defies the nature of insurance
 - Insurance is placed against a precisely defined and fixed outcome--each change would reopen terms and coverage of an insurance policy

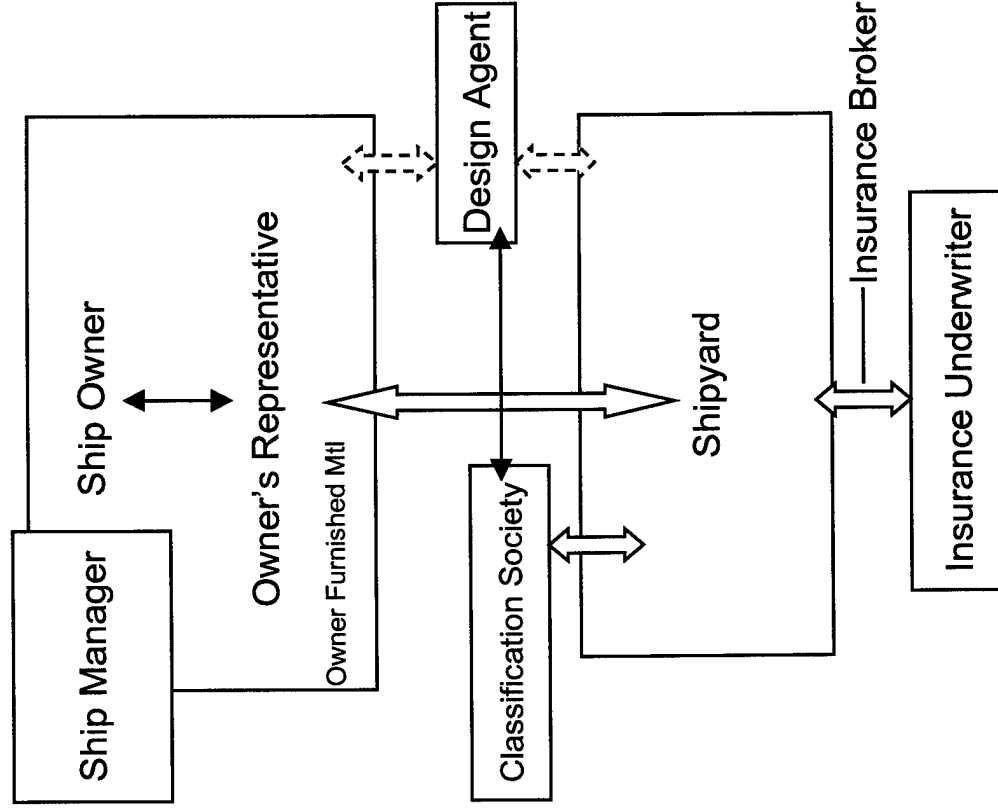
Outsource potential

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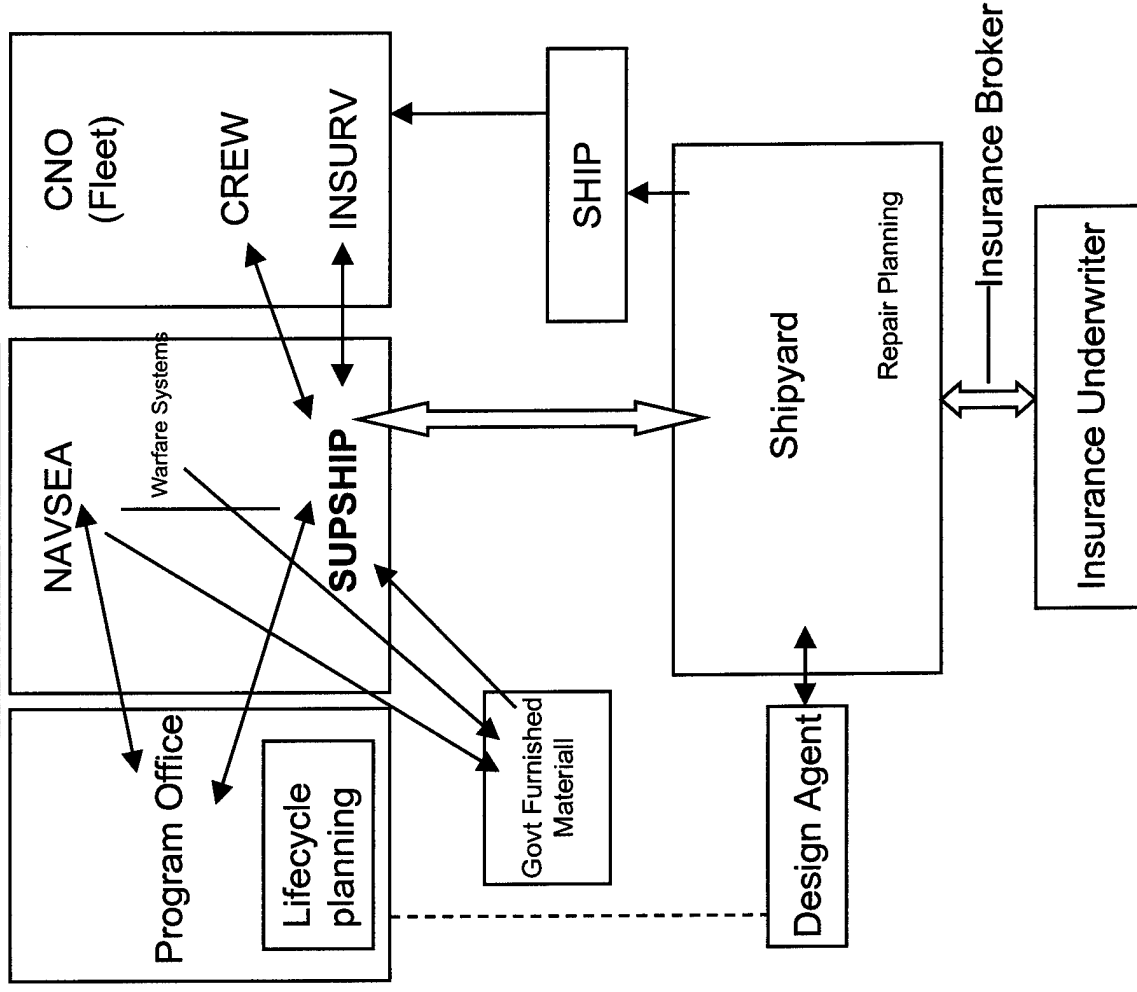


Outsource potential--ship construction processes

Commercial Construction



US Navy Construction



Outsource potential

Many SUPSHIP functions are not appropriate for outsourcing

- Typically, activities that yield the greatest savings when outsourced are
 - non-core: activities that are not unique to the organization's mission--usually activities that support the mission
 - not world-class: the organization does not have the best equipment, procedures, people, and experience in that activity
 - other organizations exist that are world-class, have achieved scale economies, and offer the function to others at some cost
- Key SUPSHIP functions do not meet this definition
 - construction of unique, best-in-world warships is fundamental to the US Navy mission
 - the process of overseeing construction and integrating DOD-developed systems, doctrine and people is a core function
 - the US Navy does have world-class experience (and certainly best in the U.S.), people, and procedures
 - no US organization has the scale or experience that would make it more efficient than the Navy

Outsource potential--how efficient is SUPSHIP compared to commercial oversight?

SUPSHIP is efficient relative to the commercial sector

- Mercer interviewed managers of US-based vessel operations to understand the costs and processes typical in oversight of ship construction
- Operators of vessels with complex equipment and missions were targeted as the closest approximation to Navy operations
- **On the basis of oversight expenditure as a percentage of contract value, SUPSHIP compares favorably to commercial operators**
 - This is especially true when grouped with operators with a high degree of doctrine ownership in the design and integration of vessel systems
- **Head count is higher at SUPSHIP, but economies are achieved by**
 - permanent staff onsite, which reduces travel and other expenses
 - low overhead
 - government pay scale and benefits
 - ability to manage multiple functions as set forth on page 6

Outsource potential--how efficient is SUPSHIP compared to commercial oversight?

SUPSHIP's productivity should be evaluated in light of the Degree of Doctrine Ownership inherent in US Naval shipbuilding

Mercer defined the "Degree of Doctrine Ownership" framework to categorize shipbuilding projects and the extent of owner involvement required, from 1 (low) to high (5)--listed in descending order

5) Operator "owns" the doctrine

- the operator has developed the operating doctrine for the vessel type
- no yard, consultant, or other entity can put all the pieces together
- the operator retains responsibility for overall vessel performance, because no contractor can assume responsibility for components that it does not understand
- the number and technical complexity of systems add to the complexity of overseeing the construction process
 - variety of vendors
 - intricate timing
 - systems integration requirements

4) Mission-defining components are supplied and integrated by the operator

- like (5) but the doctrine is not unique to a single operator
- the yard understands only part of the vessel design and mission
- the operator adds knowledge and experience in the vessel's mission to the construction process
- the yard cannot select and integrate many of the components

Outsource potential--how efficient is SUPSHIP compared to commercial oversight?

SUPSHIP's productivity should be evaluated in light of the Degree of Doctrine Ownership inherent in US Naval shipbuilding

- 3) Operator modification of a common design
 - the operator designs the ship to its specific operating needs and environment
 - deep understanding of the ship's mission and economics are reflected in unique one-off or series design
- 2) Operator provided designs
 - similar to off-the-shelf except that the yard does not offer a standard design, rather the operator supplies design from a naval architect
 - enables the operator to acquire the vessel optimally suited for its trade
- 1) Off-the-shelf
 - mission of the ship is 'standard', not complex, well understood by the shipyard
 - designed by the shipyard
 - owner's choices are only yard-offered options or minor modifications

Outsource potential--how efficient is SUPSHIP compared to commercial oversight?

SUPSHIP costs are comparable to those of less complex vessels and processes

| | Vessel Type | Degree of Doctrine Ownership | Project Scale (Newbuild \$) | Oversight as % of contract value | Approx. number and/or value of change orders | People employed in oversight (on site/ HQ) |
|-----------------------|-------------------------------|------------------------------|-----------------------------|----------------------------------|--|--|
| Seabulk | US Flag Chemical Tanker | 2 | \$48M | 1.7% (~2.5% w/class) | 1 0.25% | 8-10 for 3 Vessels 1 at HQ |
| Carnival Cruise Lines | Foreign Flag Cruise Ship | 3 | \$430M | ~0.9% (1.5-2% w/class) | <\$10M ~2% | 45 for 3 Vessels/yr 36 at two offices |
| Polar Tankers | US Flag Crude Oil Tanker | 3 | \$166M | 1.8-2.5% (2.9-3.5% w/class) | 30 orders/200 items ~1.5% | 10 for 3 Vessels 5-6 FTE at HQ |
| Santa Fe Drilling | Semi-submersible drilling rig | 4 | \$150-175M | ~3% | | 16-20 per Vessel 5-10 at HQ |
| Noble | Semi-submersible drilling rig | 4 | | 3-4% (3.8-4.9% w/class) | 11-12% | 30 for 4 vessels 8-10 at HQ |
| Global | Drillship | 4 | \$160M | ~4% (4.5-4.8% w/class) | 50 | 40 for 2 vessels |
| Transocean | Semi-submersible drilling rig | 4 | \$250-320M | 3-4% (3.5-4.5% w/class) | 200-300 ~6% | 20 per Vessel |
| Oceaneering | Multi-Purpose Vessel | 5 | \$20M | 3% (~4% w/class) | 10 2.5% | 2 per Vessel 0.5 FTE at HQ |
| SUPSHIP | Warship | 5 | \$500M | 1.8% | 900-1000 | 200 |

Source: Executive interviews, Fairplay Register 2000, SUPSHIP.

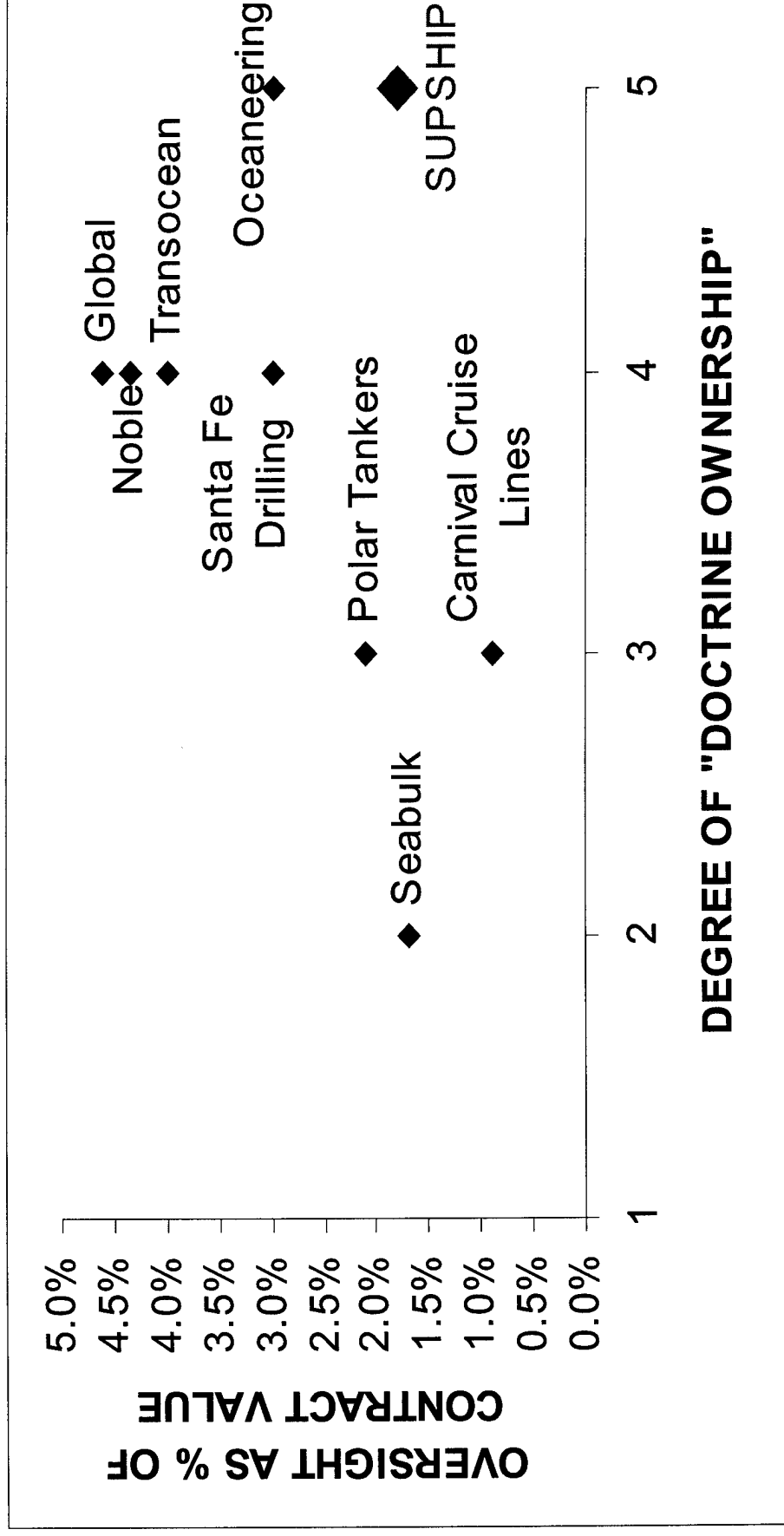
Note: Where oversight percentage not provided, cost assumed to be \$150K/yr per employee in compensation and expenses.

Note: SUPSHIP figures derived as follows: Total budget = \$18M; 10% of man hours for O&M; Construction budget = \$16.2M. Annual payment to BIW for new construction = \$880M (yr 2000 and average of next 5 years). \$16.2M/\$880M=1.8%

Note: "Class" is the service provided by societies such as American Bureau of Shipping and Lloyd's Register, and include inspection of ship construction work to verify adherence to a set of engineering standards. Comparable functions are performed by SUPSHIP for the Navy, and these costs are therefore included as a part of commercial oversight, for comparison purposes.

Outsource potential--how efficient is SUPSHIP compared to commercial oversight?

SUPSHIP productivity is superior to that of similarly complex vessels and comparable to that of much simpler ship construction processes



Source: Executive interviews, Fairplay Register 2000, SUPSHIP.
Note: Where oversight percentage not provided, cost assumed to be \$150K/yr per employee in compensation and expenses.
"Degree of Doctrine Ownership" is a subjective framework developed by Mercer.

Outsource potential--is it feasible to outsource responsibility for meeting project goals?

High level of “doctrine ownership” requires owner involvement in vessel construction

“We manage the risk internally because no one contractor can be held responsible for integrating all the different components. We specify the equipment and know how it needs to work so we have to make sure that it all works together”

--Clyde Hewlett, Manager of Projects, Oceaneering

- Oceaneering has pioneered technologies and doctrines for undersea work in the offshore energy industry
- Previous vessels were offshore supply vessels converted and adapted to their mission
- Recently, Oceaneering constructed two vessels specifically designed, built, and outfitted for underwater work
- Oceaneering retained control and responsibility for the integration of a wide variety of advanced systems: propulsion, control, navigation, payload

Outsource potential--could SUPSHIP responsibilities could be outsourced, and at what price?

SUPSHIP's functions are not performed on a large scale in the private sector, and could not be economically replicated

- Construction oversight capability does not exist in the United States that could perform SUPSHIP functions
 - oversight is performed primarily in-house or by small contractors
 - repair oversight, such as that performed by classification societies, focuses on accept/reject, not quality assurance
 - to replicate SUPSHIP's functions more efficiently would require an organization with existing economies of scale in similar business lines
- Were the capabilities to be assembled by a commercial entity, costs would be higher than SUPSHIP's
 - Government contractors bill at approximately 220% of the actual salary cost of the worker.
 - Wage = 100%
 - Benefits = 35%
 - Supervision, indirect labor, downtime, business development, etc at about =65%
 - General and administrative overhead = 15-17%
 - Target profit = 6-9%
 - **To match SUPSHIP's cost, the entity would need to have people, systems, and economies of scale to accomplish the same mission with fewer than half the personnel**

Risk transfer potential

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Risk transfer potential

DOD bears the largest, most complex, and comprehensive risks because shipbuilders cannot

- | • SHIPYARD RISKS | • DOD RISKS |
|--|---|
| • Third party liability | • Damage to vessel |
| • Workmanship | • Damage from piracy |
| • Care and protection of ship | • Secondary damage |
| • Workman's compensation | • Cost overruns up to 20 or 30% (typical) shared 50/50 with shipyard |
| • Cost overruns up to 20 or 30% (typical) shared 50/50 with DOD | • Project risks of not delivering a quality vessel on time at the budgeted cost <ul style="list-style-type: none">– risk of failing to meet fleet availability requirements– risk of expending resources that become unavailable for other projects– operational risks of variance from design specifications |
| • Cost overruns over 20 to 30% (typical) borne fully by shipyard | |

Risk transfer potential

The insurance market is not an option for placement of US Navy project risks

- Insurers underwrite physical risks based on shipbuilders' history, procedures, and certifications
 - underwriters are NOT shipbuilding experts
 - they depend on independent assessments (ISO, ISM, etc.) to gain a measure of a shipyards' quality
- Classification societies cannot fill the void because they represent the shipyard, not the buyer; a third party would need to work on behalf of the USN
 - even if class was retained by the Navy, conflicts of interest would arise (for example in a yard that also builds commercial vessels)
- Surveyors are employed by insurers to accept or reject yard work; they are not adept at assuring 'built-in quality' or managing emerging problems

Risk transfer potential

Shifting of risk and responsibility to the builder is also not a realistic option

- Shipyard liability is typically limited to liquidated damages up to a certain limit
 - quantification of damages to the Navy would be difficult, if not impossible
 - once the maximum penalty is reached, the shipyard has no incentive to perform
 - there could even be an incentive to shift resources from a delayed project to one where the maximum penalty was not reached
- Were shipyards to accept greater project risk and responsibility, they would charge more money that could exceed the Navy's current oversight costs
- The Navy's costs for testing and acceptance would rise, as more destructive testing would be required at delivery to verify the builder's compliance

Risk transfer potential--could shipbuilders assume a larger share of project risk?

Financial pressures on Naval contractors demand vigilance against cutting corners

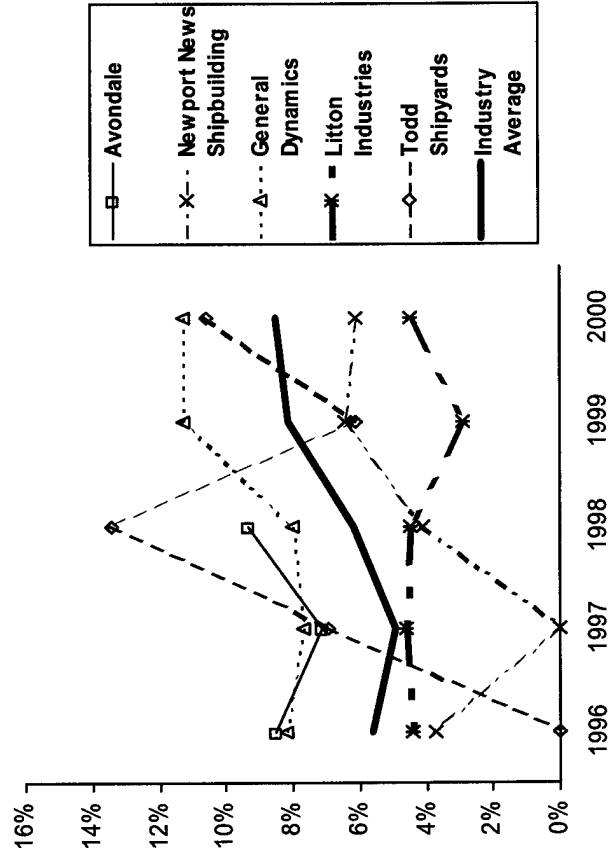
- Consolidation continues to sweep the defense industry following a period in which the industry failed to earn its cost of capital
- Acquisition of industrial, highly developed, asset-intensive yards by hi-tech, knowledge-based companies generates expectations of returns commensurate with knowledge-based industries
- The Navy must be omnipresent and in full control of its programs in order to manage its interests as the sole customer of increasingly large and sophisticated defense contractors that expect and pursue higher margins

Source: Hoover's Online

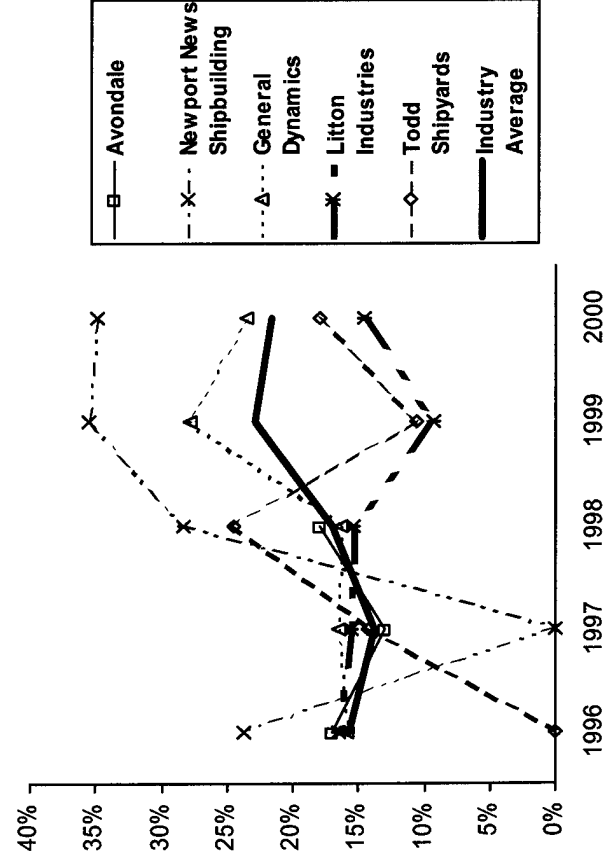
Risk transfer potential--could shipbuilders assume a larger share of project risk?

Financial pressures on Naval contractors demand vigilance against cutting corners

Contractor ROA (nominal target = 9%)



Contractor ROE (nominal target = 20%)



Source: Hoover's Online
Note: ROA (Return On Assets) is defined by Hoover's Online as net income divided by total assets
Note: ROE (Return On Equity) is defined by Hoover's Online as net income divided by shareholder's common equity

Recommendations and next steps

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Recommendations and next steps

Future efforts should focus on improving SUPSHIP, not outsourcing it

- SUPSHIP can best demonstrate its value to the Navy by quantifying its performance and value added relative to the work produced under its supervision and the requirements placed on the unit
 - develop performance metrics that measure dollars spent per unit of output (dollar of construction, change order processed, etc.)
 - record and analyze deviations in the demands placed on SUPSHIP (change orders, conflicting requirements from NAVSEA and PEOs, regulation and procedure changes)
 - measure SUPSHIP costs in addition to man hours
 - measure factors that affect SUPSHIP costs, so that these can be factored into other analyses

Backup slides

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- • Backup slides

- SUPSHIP's MULTIPLE ROLES REDUCES THE COST OF QUALITY ASSURANCE
 - SUPSHIP has many responsibilities, many of which are unrelated to quality assurance
 - Only a portion of SUPSHIP's total cost is directly related to overseeing the work in progress and assuring quality
 - Some core roles would be retained by the government under even the most extreme and hypothetical outplacement/transferral scenarios

- INSURED OUTCOME
- Insurance of the desired outcome cannot assure the outcome
 - Insurance is financial; SUPSHIP's mission is not primarily financial
- UNDERWRITER INTERVENTION
- Insurance underwriters would require intense inspection and oversight of the project that would rival/exceed SUPSHIP's scope and cost
 - These procedures would be conducted with an array of private contractors, each charging margins to cover business development costs, commercial risk, target profitability, and contingencies for additional effort, project liabilities, and litigation defense
- INSURANCE TRANSACTIONAL COSTS
- Insurance would entail payments to cover premiums, brokerage and underwriting fees, and administrative costs by the brokers and underwriters
 - The unique characteristics and limited number of USN shipbuilding programs might not create sufficient numbers of risks to support premiums, threatening the ability to place the risk

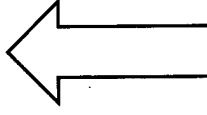
- USN PROGRAM INSIGHT
- The USN could not rely on the underwriter's program management organization for information or control before, during, or after the program
 - The underwriter's organization would protect the underwriters from claims lodged by the USN and or the contractor(s)
 - Consequently, the USN would have to create its own organization to monitor the project or be "blind" during the program, relying only on testing and evaluation of the completed product
 - If the risk were insured, the USN would not be able to influence program outcomes, it could only accept or reject the product upon delivery
 - If the USN was not satisfied, it would not have a base of knowledge to force rectification of its requirements and would be at a severe disadvantage

- LEGAL DEFINITION
- The multiple roles performed by SUPSHIP in a legally binding, contractual manner that would avoid subsequent litigation and failure would be unprecedented in the global naval shipbuilding industry
 - SUPSHIP engineering, planning, material control, project management, quality assurance, financial, training, and life cycle support roles are complex and program specific
- PRIVATE SECTOR CAPACITY
- The capability to perform these functions does not exist in the private sector
 - No professionals outside of SUPSHIP are performing similar services for the US Navy
- NAVY RETENTION OF PAYOR RESPONSIBILITIES
- The USN would continue to have to perform certain functions even if insurance and outsourcing of the final product were possible
 - Ultimately, the USN would need to approve physical progress, configuration and quality and would incur administrative costs to do so

- DEVELOPMENT OF NEW ACCEPTANCE PROCEDURES
- The final acceptance by the USN would require the development of an entirely new acceptance program that would include costlier partial de-construction and destructive techniques
 - The USN would not be able to rely upon independent, progressive approvals of work-in-process

SUPSHIP should better track the inputs and outputs of its activities

- INPUTS
- New Construction Oversight
- Testing and Trials
- Program Finance and Budgeting
- Crew Orientation
- Post Delivery Availabilities
- Other



- SUPSHIP's current strategy is to exercise control over new construction programs by applying professional oversight to all aspects of program control
 - SUPSHIP uses its own analysis, inspections, and evaluations to manage the quality, cost, and delivery date of new ship construction
 - SUPSHIP's involvement extends through the construction, acceptance, activation, and service lives of naval vessels

Outsource potential--what portion of SUPSHIP responsibilities could be outsourced?

Backup

| | Independent ManYear | Dependent ManYear | Independent Share | Dependent Share | % Independent Remaining | Independent ManYrs. Remaining | % Dependent Remaining | Dependent ManYrs. Remaining | Total Remaining ManYrs |
|-------------------------------------|---------------------|-------------------|-------------------|-----------------|---------------------------------------|-------------------------------|-----------------------|------------------------------------|------------------------|
| Command Management | | 42.6 | 0.0% | 50.1% | | - | 51% | 21.9 | 21.9 |
| Leave | | 40.1 | 0.0% | 47.2% | | - | 51% | 20.6 | 20.6 |
| DDG Change & Design Review | 26.8 | | 20.8% | 0.0% | 50% | 13.4 | | | 13.4 |
| DDG Production Assessment | 25.3 | | 19.7% | 0.0% | 10% | 2.5 | | | 2.5 |
| DDG Availability Planning | 20.6 | | 16.0% | 0.0% | 100% | 20.6 | | | 20.6 |
| DDG Material Management | 9.8 | | 7.7% | 0.0% | 10% | 1.0 | | | 1.0 |
| DDG Accept Ship/Integrate Crew | 9.7 | | 7.6% | 0.0% | 50% | 4.9 | | | 4.9 |
| DDG Business Assessment | 7.8 | | 6.1% | 0.0% | 33% | 2.6 | | | 2.6 |
| DDG Business and Contracts | 6.8 | | 5.3% | 0.0% | 33% | 2.2 | | | 2.2 |
| LPD Change & Design Review | 4.7 | | 3.6% | 0.0% | 50% | 2.3 | | | 2.3 |
| DDG Test and Integration | 3.4 | | 2.6% | 0.0% | 150% | 5.1 | | | 5.1 |
| Non-hull Business/Contracts | 2.8 | | 2.2% | 0.0% | 100% | 2.8 | | | 2.8 |
| Non-hull Production Assessment | 2.4 | | 1.9% | 0.0% | 100% | 2.4 | | | 2.4 |
| FFP Availability Planning | 1.6 | | 1.2% | 0.0% | 100% | 1.6 | | | 1.6 |
| Non-Hull Availability Planning | 1.5 | | 1.1% | 0.0% | 100% | 1.5 | | | 1.5 |
| LPD Business and Contracts | 1.4 | | 1.1% | 0.0% | 33% | 0.4 | | | 0.4 |
| LPD Production Assessment | 1.1 | | 0.9% | 0.0% | 10% | 0.1 | | | 0.1 |
| Non-hull Change and Design Review | 1.0 | | 0.7% | 0.0% | 100% | 1.0 | | | 1.0 |
| LPD Command Management | | 0.9 | 0.0% | 1.1% | | - | 51% | 0.5 | 0.5 |
| DDG Command Management | | 0.9 | 0.0% | 1.1% | | - | 51% | 0.5 | 0.5 |
| Non-hull Business Assessment | 0.8 | | 0.7% | 0.0% | 100% | 0.8 | | | 0.8 |
| Non-hull Material Management | 0.7 | | 0.5% | 0.0% | 100% | 0.7 | | | 0.7 |
| Union | | 0.5 | 0.0% | 0.5% | | - | 51% | 0.2 | 0.2 |
| LPD Business Assessment | 0.4 | | 0.3% | 0.0% | 33% | 0.1 | | | 0.1 |
| LPD Test and Integration | 0.0 | | 0.0% | 0.0% | 150% | 0.1 | | | 0.1 |
| Non-hull Accept Ship/Integrate crew | 0.0 | | 0.0% | 0.0% | 100% | 0.0 | | | 0.0 |
| TOTALS | 128.6 | 85.0 | 100% | 100% | % Independent ManYrs Remaining | 66.1 | | 43.7 | 109.7 |
| | | | | | 51% | | | % of Total ManYrs Remaining | 51% |

Source: Mercer analysis of SUPSHIP data (1999)